Claims

1. An isolated DNA comprising a nucleotide sequence encoding a ubiquitin-specific protease selected from the group of:
(a) SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10
(b) a fragment of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10
(c) a derivative of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10
(d) a substantially homologous sequence of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10.

2. An isolated DNA according to Claim 1 consisting of a nucleotide sequence selected from the group of SEQ ID No. 2, SEQ ID No. 6 or SEQ.ID No. 10.

3. An isolated DNA according to Claim 1 wherein said fragment comprises at least 50 nucleotides of nucleotide sequence selected from the group consisting of SEQ ID No. 2, SEQ ID No. 6, or SEQ.ID No. 10 and retains ubiquitin-specific functional activity.

4. An isolated DNA according to Claim 1 comprising a nucleotide sequence which is at least 80% homologous to a nucleotide sequence selected from the group consisting of SEQ. ID No. 2, SEQ ID No. 6, or SEQ.ID No. 10 and retains ubiquitin-specific functional activity.

5. An isolated DNA comprising a nucleic acid sequence from about 30-50 nucleotides which hybridizes under high stringency conditions to an isolated DNA of any one of Claims 1-4.

6. An isolated polypeptide of an ubiquitin-specific protease comprising the amino acid sequence selected from the group of:
(a) SEQ.ID. No.1, SEQ.ID.No.5, SEQ.ID No. 9
(b) a fragment of SEQ.ID. No.1, SEQ.ID.No.5, SEQ.ID No. 9
(c) a derivative of SEQ.ID. No.1, SEQ.ID.No.5, SEQ.ID No. 9
(d) a substantially homologous sequence of SEQ.ID. No.1, SEQ.ID.No.5, SEQ.ID No. 9.

7. An isolated polypeptide according to Claim 6 consisting of an amino acid sequence selected from the group of SEQ.ID. No.1, SEQ.ID.No.5, or SEQ.ID No. 9.

8. An isolated polypeptide according to Claim 6 wherein said fragment comprises at least 5 contiguous amino acids of the amino acid sequence selected from the group of SEQ.ID. No.1, SEQ.ID.No.5, or SEQ.ID No. 9.

9. An isolated polypeptide according to Claim 6 which is at least 80% homologous to an amino acid sequence selected from the group consisting of SEQ. ID No. 1, SEQ ID No. 5, or SEQ.ID No. 9 and retains ubiquitin-specific functional activity.

10. An isolated polypeptide according to Claim 6 wherein said derivative is functionally equivalent to a ubiquitin-specific protease.

11. A host cell comprising an isolated DNA according to any one of Claims 1-5.

12. A vector comprising an isolated DNA according to any one of Claims 1-5.

13. A vector according to Claim 12 comprising transcriptional control sequences.

14. A host cell comprising a vector according to Claim 12 or 13.

15. A method for the diagnosis of breast cancer in a human comprising measuring the amount of a polypeptide that comprises a polypeptide according to any one of Claims 6 -10, in breast tissue from a human, wherein the presence of an elevated amount of said polypeptide relative to the amount of said polypeptide in normal breast tissue is diagnostic of said human's suffering from breast cancer.

16. A method for diagnosis according to claim 15, wherein said detecting step comprises contacting said breast tissue with an antibody which specifically binds to a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10 and detecting specific binding of said antibody with a polypeptide in said breast tissue, wherein detection of specific binding to a polypeptide indicates the presence of a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10.

17. A method for diagnosis according to Claim 15 or Claim 16 wherein said amino acid sequence comprises SEQ ID. No. 1, a fragment, derivative or homologue thereof.

18. A method for the diagnosis of leukemia in a human which comprises measuring the amount of a polypeptide that comprises a polypeptide according to any one of Claims 6 -10 in peripheral blood cells, especially lymphoid cells, wherein the presence of an elevated amount of said polypeptide relative to the amount of said polypeptide in normal peripheral blood cell, especially lymphoid cells is diagnostic of said human's suffering from leukemia.

19. The method of claim 18, wherein said detecting step comprises contacting said peripheral blood cells, especially lymphoid cells with an antibody which specifically binds to a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10 and detecting specific binding of said antibody with a polypeptide in said peripheral blood cells, wherein detection of specific binding to a polypeptide indicates the presence of a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10.

20. A method for diagnosis according to Claim 18 or Claim 19 wherein said amino acid sequence comprises SEQ ID. No. 5, a fragment, derivative or homologue thereof.

21. A method for the diagnosis of brain disorders in a human which comprises measuring the amount of a polypeptide that comprises a polypeptide according to any one of Claims 6 - 10 in the amgdala, spinal cord or olfactory bulb tissues, wherein the presence of an elevated amount of said polypeptide relative to the amount of said polypeptide in amgdala, spinal cord and olfactory bulb tissues is diagnostic of said human's suffering from a brain disorder.

22. The method of claim 21, wherein said detecting step comprises contacting said the amgdala, spinal cord or olfactory bulb tissues with an antibody which specifically binds to a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10 and detecting specific binding of said antibody with a polypeptide in said brain tissue, wherein detection of specific binding to a polypeptide indicates the presence of a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10.

23. A method for diagnosis according to Claim 21 or Claim 22 wherein said amino acid sequence comprises SEQ ID. No. 9, a fragment, derivative or homologue thereof.

24. An antibody which specifically binds to a polypeptide that comprises the amino acid sequence set forth in any one of Claims 6-10.

25. An antibody according to Claim 24 which is an Fab or F(ab')2 fragment.

26. An antibody according to Claim 24 which is a polyclonal antibody.

27. An antibody according to Claim 24 which is a monoclonal antibody.

28. A pharmaceutical composition comprising an antibody according to claims 24-27.

29. A method for the treatment of breast cancer comprising administering an effective amount of an inhibitory nucleic acid suitable to inhibit the expression of a gene comprising an nucleic acid sequence selected from the group consisting of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10, to a breast cancer patient.

30. A method for the treatment of leukemia comprising administering an effective amount of an inhibitory nucleic acid suitable to inhibit the expression of a gene comprising a nucleic acid sequence selected from the group consisting of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10, to a leukemia patient.

31. A pharmaceutical composition comprising an inhibitory nucleic acid suitable to inhibit the expression of a gene comprising an nucleic acid sequence selected from the group consisting of SEQ ID No. 2, SEQ ID No. 6, SEQ.ID No. 10 and pharmaceutically acceptable carrier.

32. A diagnosis kit for a disease involving an ubiquitin-specific protease comprising at least one of the following components:
(a) an oligonucleotide suitable for the detection of a nucleic acid comprising a nucleotide sequence, or part of a nucleotide sequence, as set forth in SEQ ID No.2, SEQ ID. No.6 or SEQ ID No.10,
(b) an antibody suitable for the detection of a polypeptide comprising an amino acid sequence, or part of an amino acid sequence, as set forth in SEQ ID. No. 1, SEQ ID No. 5 or SEQ ID. No.9,
(c) instructions for using the kit.